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INVESTOR IN PEOPLE

The Patent Office
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South Wales
NP10 8QQ

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Dated 9 January 2004

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P01/7700 0.00-0229270.4

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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

16 DEC 2002

The Patent Office

Cardiff Road
Newport
South Wales
NP9 1RH

1. Your reference — RSJ07595GB

2. Patent application number *(The Patent Office will fill in this part)* — 0229270.4

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Ishida Europe Limited
11 Kettles Wood Drive
Woodgate Business Park
Birmingham
B32 3DB

Patents ADP number *(if you know it)* 6758926002

If the applicant is a corporate body, give the country/state of its incorporation — Great Britain

4. Title of the invention — Weight Checking Method

5. Name of your agent *(if you have one)* — Gill Jennings & Every

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Broadgate House
7 Eldon Street
London
EC2M 7LH

Patents ADP number *(if you know it)* — 745002 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

YES

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	5
Claim(s)	2 CF
Abstract	-
Drawing(s)	1 + 1

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	-
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	NO

11. For the applicant
Gill Jennings & Every

I/We request the grant of a patent on the basis of this application.

Signature [signature] Date 16 December 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

R.E. Skone James
020 7377 1377

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.

b) Write your answers in capital letters using black ink or you may type them.

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WEIGHT CHECKING METHOD

This invention relates to a method for determining the quantity of items packed in a container in order to ascertain whether a desired quantity of the items is present in the container.

Check weighers for use on production lines are well known. They are typically used to confirm that the quantity of items packed into a container is correct. One such system has a conveyor suspended on a load cell which produces a signal indicative of the weight of the container on the conveyor. Each packed container passes over this weighing conveyor before reaching the end of the line so that the quantity of items packed in the container can be confirmed to be the desired quantity. For example, crisp or potato chip packets are commonly supplied in cardboard containers of 48 individual packets and each individual packet weighs 30 grams. Thus, the check weigher will know that the correct quantity of crisp packets have been packed into the cardboard container if the nett weight is equal to the product of 48 packets and 30 grams, i.e. 1.44 kilograms.

However, each of these crisp packets has a weight tolerance of 1 gram. Thus, the cumulative tolerance of 48 packets of crisps means that the actual nett weight of the packed cardboard container is 1440 grams ± 48 grams. This deviation of 48 grams is greater than the weight of an individual packet and so there is a possibility that either containers may be shipped with one too many or one too few packets of crisps or alternatively containers with the correct number of individual packets are rejected. Hence, there is a need for a check weigher that can accurately determine the quantity of items packed into a container on an automatic production line.

In accordance with a first aspect of the present invention, there is provided a method for determining the quantity of items in a container, each item having the same

nominal weight located between upper and lower weight limits, the method comprising:

a. attempting to pack a predetermined quantity, n, of the items in the container, the predetermined quantity, n, being selected such that the product of (n+1) and the lower weight limit exceeds the product of n and the upper weight limit and such that the product of n and the lower weight limit exceeds the product of (n-1) and the upper weight limit;

b. measuring the weight of the actual quantity of items packed in the container in step (a); and,

c. dividing the value of the weight ascertained in step (b) by the nominal weight to determine the actual quantity.

Thus, the invention provides a method for determining the quantity of items packed into a container that is not affected by the cumulative weight tolerance of all the items that are packed into the container.

Normally, steps (a) to (c) are repeated until the sum of the predetermined quantities of step (a) of each repetition equals a specified quantity (typically corresponding to a "full" container). In this way, the method allows for determining the quantity of items packed into a container to be ascertained accurately and independently of the cumulative tolerance irrespective of the total quantity of items packed into the container.

Typically, the weight of step (b) is measured using a check weigher and this will preferably form part of a production line. Such a production line will normally include an upstream packaging machine.

In one example, the items packed in the container are packets of snack foods.

If the actual quantity determined in step (c) is different from the predetermined quantity of step (a) then the container may be conveyed to a reject location, for example a reject conveyor belt.

In such a case, if the actual quantity determined in step (c) is less than the predetermined quantity of step (a) then additional items may be packed in the container so that it does contain the predetermined quantity of items.

Alternatively, if the actual quantity determined in step (c) is more than the predetermined quantity of step (a) then the surplus items may be removed from the container so that it contains the predetermined quantity of items.

An embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 shows a production line incorporating a check weigher for use with the invention; and

Figure 2 shows apparatus for diverting containers to be rejected from the production line.

Figure 1 shows part of a production line used for packaging packets of snack foods, such as crisps. The production line comprises an infeed conveyor 1, a weighing conveyor 2 and an outfeed conveyor 3. The weighing conveyor 2 is supported on rollers 4a, 4b which are mounted on a support frame 20. This bears upon a load cell 21 which produces signals indicative of the weight suspended on conveyor 2 and supplies these to controller 22.

An empty container 5 ready for packing is held on infeed conveyor 1 whilst container 6 is packed as it is conveyed along weighing conveyor 2. A fully packed container 7 is conveyed away from weighing conveyor 2 by outfeed conveyor 3. The packets of snack foods are packed into container 6 using vacuum head 8 in a conventional way.

In this example, the packets of snack foods are crisp packets and the containers 5, 6, 7 are each intended to hold forty eight individual crisp packets. These packets have been filled by a packaging machine (not shown) controlled to ensure that each packet has a weight of 30 grams with a tolerance of ±1 gram.

Vacuum head 8 places eight packets of crisps into container 6 in one cycle. However, there is a possibility

that too few packets will be packed by mistake. The quantity n of crisp packets packed into the container in one cycle by vacuum head 8 is selected such that the product of (n+1) and the lower weight limit of a crisp packet exceeds the product of n and the upper weight limit and such that the product of n and the lower weight limit of a crisp packet exceeds the product of (n-1) and the upper weight limit.

As previously mentioned, if all forty eight packets are packed into the container 6 before its weight is checked then it is not possible to determine whether a deviation of more than 30 grams from the correct net weight is due to the cumulative tolerance or due to there being one too few or one too many packets of crisps in the container.

In this instance, the upper and lower weight limits are 31 and 29 grams respectively and so setting n equal to eight satisfies both of the above criteria.

When the vacuum head 8 has released the crisp packets into container 6, the weight of the container 6 is measured and load cell 21 provides a signal indicative of this weight to controller 22. Controller 22 then divides the value of the weight of the crisp packets, allowing for the tare of container 6, by the nominal weight of a crisp packet (i.e. 30 grams). The actual quantity of crisp packets placed in the container by vacuum head 8 during that cycle can then be obtained by rounding the result of this division to the nearest integer. This cycle is repeated six times so that at the end of the process, container 6 should contain forty eight packets of crisps.

However, if during one of the six cycles only seven packets of crisps are loaded into container 6 then the controller 22 can detect this. This can be done in one of two ways. Firstly the controller 22 can add together the actual quantities of crisp packets packed in container 6 during each cycle and indicate an error if this total does not equal forty eight after all six cycles have been

completed. Alternatively, the controller 22 can indicate an error as soon as it detects that only seven packets have been packed in the current cycle.

In the event that controller 22 indicates an error then container 6 can be diverted from the main production line.

Apparatus for enabling this is shown in Figure 2 in which the outfeed conveyor 3 leads to a moveable conveyor 10 which can direct containers either to conveyor 11a which forms a continuation of the main production line, or to reject conveyor 11b where the rejected containers can be dealt with appropriately. Moveable conveyor 10 is moved between its two positions using hydraulic ram 12 which is actuated by controller 22.

CLAIMS

1. A method for determining the quantity of items in a container, each item having the same nominal weight located between upper and lower weight limits, the method comprising:

a. attempting to pack a predetermined quantity, n, of the items in the container, the predetermined quantity, n, being selected such that the product of (n+1) and the lower weight limit exceeds the product of n and the upper weight limit and such that the product of n and the lower weight limit exceeds the product of (n-1) and the upper weight limit;

b. measuring the weight of the actual quantity of items packed in the container in step (a); and,

c. dividing the value of the weight ascertained in step (b) by the nominal weight to determine the actual quantity of items packed in the container in step (a).

2. A method according to claim 1, wherein steps (a) to (c) are repeated until the sum of the predetermined quantities of step (a) of each repetition equals a specified quantity.

3. A method according to either of the preceding claims, wherein the weight of step (b) is measured using a check weigher.

4. A method according to claim 3, wherein the check weigher is part of a production line.

5. A method according to claim 4, wherein the production lines includes an upstream packaging machine.

6. A method according to any of the preceding claims, wherein the items are packets of snack foods.

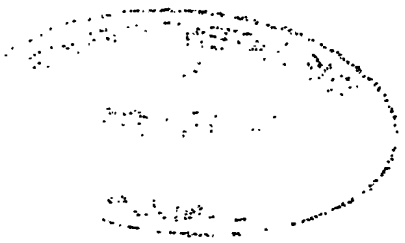
7. A method according to any of the preceding claims, wherein if the actual quantity determined in step (c) is different from the predetermined quantity of step (a) then the container is conveyed to a reject location.

8. A method according to claim 7, wherein the reject location is a reject conveyor belt.

9. A method according to either of claims 7 or 8, wherein if the actual quantity determined in step (c) is less than the predetermined quantity of step (a) then additional items are packed in the container so that it does contain the predetermined quantity of items.

10. A method according to either of claims 7 or 8, wherein if the actual quantity determined in step (c) is more than the predetermined quantity of step (a) then the surplus items are removed from the container so that it contains the predetermined quantity of items.

11. A method substantially as hereinbefore described with reference to the accompanying drawings.



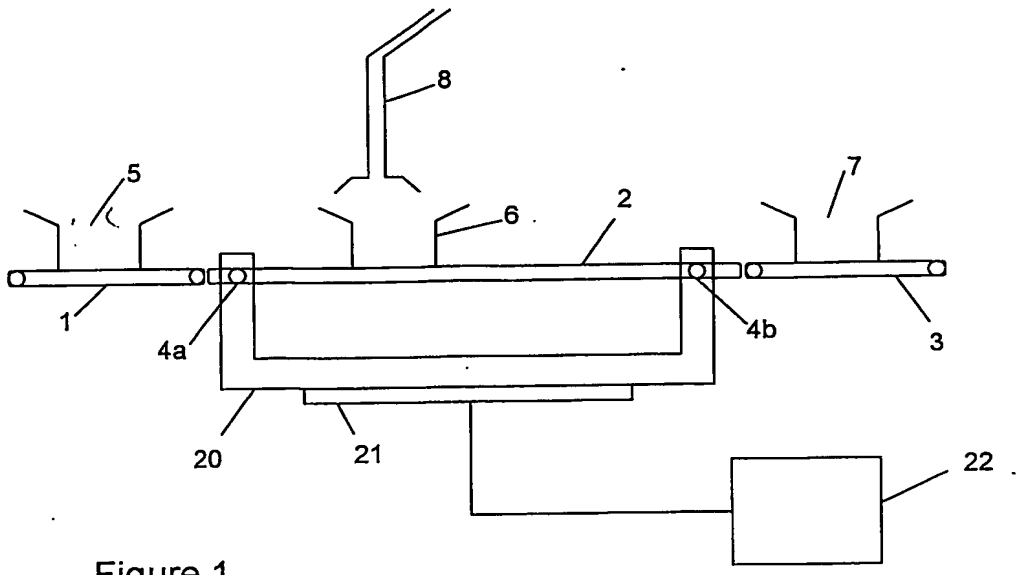


Figure 1

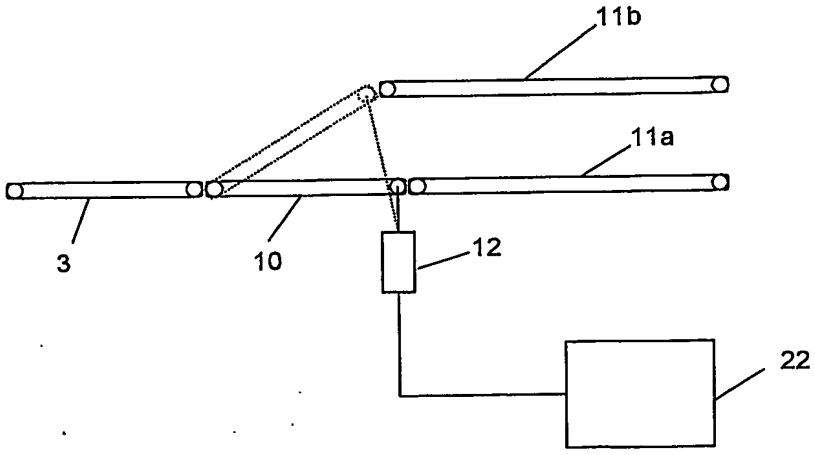


Figure 2